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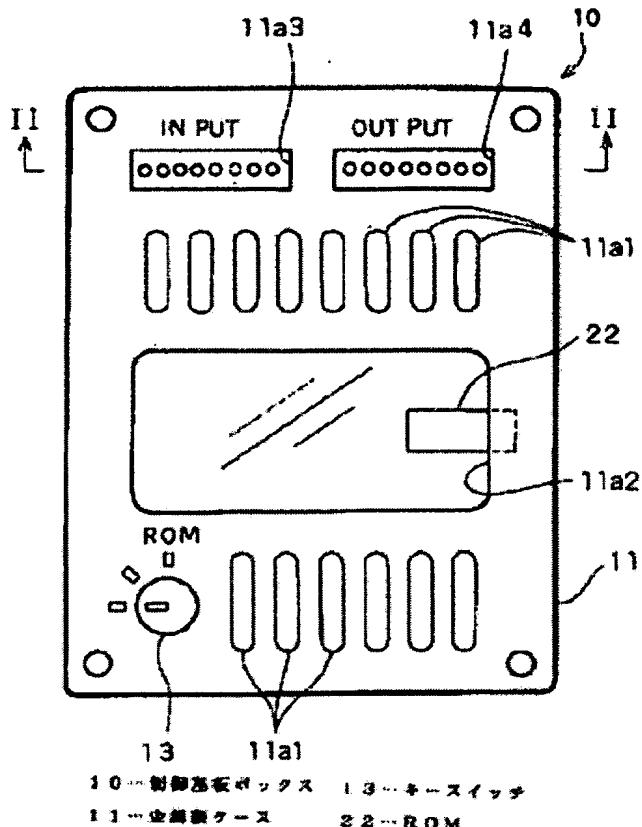
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Abstract:

PROBLEM TO BE SOLVED: To eliminate such a problem that a control board box has to be unsealed in order to check a ROM. SOLUTION: While a board 20 on which the ROM 22 is fitted is housed in a case 11 made of a metal, an LED 32 and a photo-transistor 33 are connected onto the board 20 through an interface circuit 34. At the same time, the interface circuit 34 is connected with a CPU 21 which is connected with the ROM 22. Therefore, when a specified dump-demanding command is transmitted to the photo-transistor 33 from an external optical communication interface 40, the CPU 21 can read the content of the ROM 22 during an optical communication process, and transmit the content to the external optical communication interface 40 through the LED 32.; Therefore, the dumping of the content of the ROM 22 can be easily obtained without unsealing the case 11 made of the metal, or using a dedicated connector.

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**JPO Machine translation abstract:****(57) Abstract**

SUBJECT In order to check ROM, the control substrate box had to be opened.

Means for Solution While connecting LED32 and the photo-transistor 33 via the interface circuitry 34 on the substrate 20, accommodating the substrate 20 equipped with ROM22 with the metal case 11, Since the interface circuitry 34 was connected to CPU21 connected to the above-mentioned ROM22, If a predetermined dumping demand command is transmitted to the photo-transistor 33 from the extraneous light communication interface 40, CPU21 will read the contents of the ROM22 in optical-communications processing, Dumping of the contents of ROM22 can be obtained easily, without being able to transmit to the above-mentioned extraneous light communication interface 40, and opening the metal case 11, or using a connector for exclusive use via LED32.

Claim(s)

Claim 1A control substrate box in which a control board provided with ROM which recorded a control program of a game machine is accommodated, comprising:

An optical communication interface for carrying out optical communications to the exterior.

A ROM dumping means to output a dumping result via the optical communication interface to a dumping demand of the above-mentioned ROM.

Detailed Description of the Invention**0001**

Field of the Invention This invention is used for a pachinko machine etc. and relates to a suitable control substrate box.

0002

Description of the Prior Art ROM which recorded the control program is arranged on the control board of game machines, such as a pachinko machine, and the control board was accommodated in the control substrate box, and is usually sealed so that the contents of this

ROM cannot be rewritten. However, since rewriting ROM skillfully is also performed in spite of having sealed, it will be necessary to check the contents of the ROM.

0003In order to check ROM, the sealed control substrate box was opened, ROM was taken out, it set to the ROM writer, and the case of the conventional control substrate box was comparing with regular ROM.

0004

Problem(s) to be Solved by the InventionIn the conventional control substrate box mentioned above, since the control substrate box had to be opened and removal took time and effort in order to check ROM, since it is sealed by various sealing means, SUBJECT that a check took time occurred. On the other hand, although it is not technically impossible to provide a terminal for exclusive use for a check, either, since it will be easy to be used unjustly if a terminal for exclusive use is provided, a terminal for exclusive use cannot be used.

0005This invention was made in view of the aforementioned problem, and aims at offer of the control substrate box which can dump the contents of the ROM easily.

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Means for Solving the ProblemIn order to attain the above-mentioned purpose, an invention concerning Claim 1, An optical communication interface for being a control substrate box in which a control board provided with ROM which recorded a control program of a game machine is accommodated, and carrying out optical communications to the exterior, It has composition possessing a ROM dumping means to output a dumping result via the optical communication interface to a dumping demand of the above-mentioned ROM.

0007In an invention concerning Claim 1 constituted as mentioned above, While having accommodated a control board provided with ROM which recorded a control program of a game machine in a control substrate box, The exterior and optical communications have become possible with an optical communication interface, and a ROM dumping means will output a dumping result via the above-mentioned optical communication interface, if a dumping demand of ROM is inputted. That is, it becomes possible to read ROM inside a control substrate box externally by optical communications, and it is not necessary to open a control substrate box or to adopt a connector.

0008Various kinds of composition is possible, and it is provided with light emitting devices, such as LED, at least, and if an output of data is outside possible for an optical communication interface, it is good. In this case, it may be made to use infrared rays other than visible light, etc. so that data mistaken in the light-receiving side may not be outputted. Of course, about a type of output of data, it can change suitably outputting serial, or it being parallel, and outputting, or outputting in a special format etc. This optical communication interface is available also as an input means. That is, a dumping demand of ROM may be made to input via the optical communication interface concerned, and the dumping range of ROM, etc. may be made to input.

0009A gestalt of an optical communication interface may arrange LED etc. on a substrate, or from a substrate to the control substrate box surface, as it floats, it may be arranged. In this case, what is necessary is to make the transparent window section rear face concerned approach, to arrange, and just to have composition which sends and receives a lightwave signal via a transparent window section, since a transparent window section made of resin is formed in the control substrate box itself in many cases. If it does in this way, it will agree also in a future tendency for you to make it abbreviated-seal the control substrate box itself by various sealing means. If unevenness is formed around such a transparent window section, it will become easy to carry out alignment of the optical communication interface of an outer side.

0010It usually comes out that a slit for heat dissipation is formed in a control substrate box, and it may be made to, insert an optical communication interface of an outer side via the slit concerned on the other hand for a certain reason. In this case, what is necessary is just to allocate the above-mentioned LED on a substrate, and it becomes easy to manufacture it. An optical communication interface of an outer side inserted via a slit also has a merit that alignment can be carried out by the slit concerned. While establishing a crevice for exclusive use in a control substrate box, facing an inside of the crevice concerned and arranging LED of an optical communication interface, etc., An optical communication interface of an outer side may be made to make a photo detector a position which meets the LED eight while forming heights which can be inserted into the crevice concerned. In this case, a switch is allocated in a recessed bottom face, and if it is made for the switch to serve as one when an optical communication interface of an outer side is inserted into the crevice concerned, a dumping demand of ROM can be emitted at the time of insertion.

0011On the other hand, via the above-mentioned optical communication interface, the ROM dumping means should just be ability ready for sending, for example, should just constitute the contents of the ROM with CPU for control, its control program, etc. It may have a switch and a handler, in order to input a dumping demand of ROM, and it may be made to transmit and receive this ROM dumping demand itself via an optical communication interface, as mentioned above. Of course, a read circuit for exclusive use is formed, by operating a switch, CPU for game control may be stopped and dumping may be performed.

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Effect of the InventionAs explained above, this invention can provide the control substrate box which can dump the internal contents of ROM easily without using a connector for exclusive use etc., without opening the seal of various sealing means.

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Embodiment of the InventionBelow <a first embodiment> describes the embodiment of this invention based on Drawings. Drawing 1 shows the control substrate box concerning one embodiment of this invention with the top view, and drawing 2 shows the II-II arrowed cross-section figure in drawing 1.

0014In the figure, the control substrate box 10 concerned used for game machines, such as a pachinko machine, is provided with the metal case 11 which unites and forms one housing, and the metal case 11 concerned comprises the upper case 11a and the lower case 11b. The window hole 11a2, the window hole 11a3 for optical communication interfaces mentioned later, and 11a4 are formed so that many slits 11a1 for heat dissipation may be formed in these upper cases 11a and lower cases 11b and it may be easy to look at an inside through a fluoroscope about the upper case 11a. However, the transparent resin board 12 is allocated in the rear-face side of the upper case 11a concerned so that this window hole 11a2, 11a3, and 11a4 may be closed about the upper case 11a. the window hole 11a2 -- a center portion -- the window hole 11a3 and 11a4 -- an upper part right-and-left portion -- as -- it is formed in a total of three places.

0015In this embodiment, although the housing is formed with the metal case 11 and the transparent resin board 12, it is also possible to form the whole by the transparent product made of resin. In this embodiment, although it is used for a pachinko machine, you may use it for other game machines, such as a slot machine. The metal case 11 has accommodated the substrate 20 which had various kinds of controlling elements arranged to the inside, and is connected to an external sensor and display for indication via the flat cable which is not illustrated. Eight LED32 and the eight photo-transistors 33 are supported by the bridge-like resin support members 31a and 31b by the window hole 11a3 which is on the substrate 20 concerned and was mentioned above, and the position which meets 11a4, respectively. It is connected to the interface circuitry 34 as shown in drawing 3 arranged on the substrate 20, and these LED32 and photo-transistors 33 function as one I/O circuit in CPU21 for control arranged on the above-mentioned substrate 20.

0016In this embodiment, although LED32 and the photo-transistor 33 are separately supported by the individual resin support members 31a and 31b, of course, it can also constitute from a support member of one. In this embodiment, the breakthrough 31a1 and 31b1 were formed in the resin support members 31a and 31b, and into it, as impossible ON ** was carried out, LED32 and the photo-transistor 33 are accommodated. Therefore, the error is made hard to hold the tracking of light and to produce in commo data, while keeping the excessive scattered light from a lower part, etc. from entering at least.

0017On the other hand, it is equipped also with game control I/O23 connected to the sensor of the exterior mentioned above with ROM22 which recorded the program for control to the above-mentioned CPU21, or a display on the substrate 20. In here, the program for control recorded on the ROM22 is shown in the flow chart of drawing 4, and fundamentally, After initializing at Step S100, the detecting signal of a sensor etc., etc. are inputted from game control I/O23 at Step S110, Control at Step S120 according to it was performed, and processing in which a control signal is outputted to a display for indication, an accessory, etc. via the game control I/O23 at Step 130 is repeated.

0018The key switch 13 is connected to the metal case 11, and after starting, CPU21 detects the rotation position of the key switch 13, and changes some parameters. If a prescribed position is made to rotate this key switch 13, ROM dumping instructions are meant. CPU21 performs optical-communications processing shown in drawing 5, when it detects that they are ROM dumping instructions according to the rotary place of the key switch 13, but before it explains this optical-communications processing, it explains the extraneous light communication

interface 40 shown in drawing 6 and drawing 7.

0019The extraneous light communication interface 40 is formed in the outline T type which formed the oblong head section 42 at the tip of the longwise grip part 41, The outputting part 42b which met the photo-transistor 33 on the input part 42a which met the head section 42 LED32 on the above-mentioned substrate 20, and has arranged the photo-transistor, and the above-mentioned substrate 20, and has been arranged is formed. each input part 42a and outputting part 42b corresponded to the window hole 11a3 of the above-mentioned upper case 11a, and 11a4 -- it has projected a little, it enters into the window hole 11a3 and 11a4 by the thickness of the upper case 11a, and alignment is easy. Of course, the eight photo-transistors 42a1 are arranged at the input part 42a, and eight LED42b1 is arranged at the outputting part 42b.

0020Of course, it is connected to the computer etc. which are not illustrated and this extraneous light communication interface 40 can communicate. LED32 mentioned above, 42b1, and the photo-transistor 33 and 42a1 make it hard to malfunction with visible light Lighting Sub-Division of a hole by emitting for it light and receiving infrared light in this embodiment. Next, operation of this embodiment which consists of the above-mentioned composition is explained. A worker does alignment of the input part 42a and the outputting part 42b to the window hole 11a3 which formed the extraneous light communication interface 40 in the upper case 11a of the metal case 11, and 11a4 to see the contents of ROM, and makes the support position of ROM dumping rotate the key switch 13.

0021On the other hand, although CPU21 is performing the main loop processings as shown in drawing 4 at the time of usual, if it detects that the key switch 13 rotated into the support position of ROM dumping, optical-communications processing shown in drawing 5 will be performed. CPU21 becomes command standby at Step S210 after starting of this optical-communications processing. Command standby transmits the lightwave signal showing a command by making LED42b1 of the outputting part 42b emit light so that the extraneous light communication interface 40 which stands by and mentioned above that a lightwave signal was inputted via the interface circuitry 34 may satisfy a predetermined protocol. Then, the photo-transistor 33 detects flicker of LED42b1, it is turned on and off suitably, and the interface circuitry 34 outputs this to CPU21.

0022CPU21 will analyze the command which it expresses with Step S220, if the on-off situation of the photo-transistor 33 is inputted from the interface circuitry 34. The command itself means a dumping demand, and also it also means the check request of I/O, in a dumping demand, is still more possible also for a total range, and possible also in some addressed ranges. Therefore, when it judges whether a dumping demand is first expressed with Step S230 and the analyzed command expresses a dumping demand, a total range or a designated range is further judged at Step S240. When a total range is specified, dumping is outputted at Step S250, and when addressed, only a designated range is dumped at Step S260.

0023When dumping, CPU21 reads the contents of ROM22 and makes LED32 emit light so that it may become a predetermined protocol via the interface circuitry 34. Then, the photo-transistor 42a1 of the input part 42a in the extraneous light communication interface 40 is turned on and off according to flicker of LED32, and notifies the situation to an external computer. And if a notice is completed, acknowledgement will be outputted via the outputting part 42b, and CPU21 reads the contents of the next address of ROM22 while receiving the acknowledgement like the time of command input. Hereafter, dumping of ROM22 is performed by repeating this. Of course, specifying a total range means all the addresses of ROM22, and addressing means specifying the address of ROM22.

0024Thus, while connecting LED32 and the photo-transistor 33 via the interface circuitry 34 on the substrate 20, accommodating the substrate 20 equipped with ROM22 with the metal case 11, Since the interface circuitry 34 was connected to CPU21 connected to the above-mentioned ROM22, If a predetermined dumping demand command is transmitted to the photo-transistor 33 from the extraneous light communication interface 40, CPU21 will read the contents of the ROM22 in optical-communications processing, Dumping of the contents of ROM22 can be obtained easily, without being able to transmit to the above-mentioned extraneous light communication interface 40, and opening the metal case 11, or using a connector for exclusive use via LED32.

0025When the command analyzed at Step S220 means an I/O check, CPU21 performs an I/O check at Step S270 through judgment of Step S230. In this I/O check, CPU21 checks various kinds of sensors and the operation situation of a display for indication via game control I/O23, and outputs a checked result outside from the interface circuitry 34 like ROM dumping at Step

S280. Of course, this I/O check is expedient, and although it is not necessarily required, such use is also possible besides ROM dumping.

0026<A second embodiment> Although hollow support of LED32 and the photo-transistor 33 linked to the interface circuitry 34 is carried out with the resin board 12 transparent rear face by the resin support members 31a and 31b in a first embodiment mentioned above, In a second embodiment shown in drawing 8 and drawing 9, LED132 and the photo-transistor 133 are mostly allocated on the substrate 120. However, these LED132 and photo-transistors 133 are allocated along with two or more slits 111a1 formed in the upper case 111a, Corresponding to this, the input part 142a and the outputting part 142b of the extraneous light communication interface 140 are formed in tabular **which can be inserted in the slit 111a1 / of two sheets / parallel**, as shown in drawing 10. In this case, as shown in drawing 11, the input part 142a and the outputting part 142b are formed in tubed **in the air**, the tip of a barrel contacts LED132 on the substrate 120, and the photo-transistor 133 -- exactly -- ***** - it is like and the photo-transistor 142a1 and LED142b1 corresponding to the back end are held.

0027Although the actual operation in this embodiment is the same as that of a first embodiment, the input part 142a and the outputting part 142b are inserted in the slit 111a1, and since position immobilization can be carried out, dumping becomes easy. Although the input part 142a and the outputting part 142b are formed in tabular in this embodiment, it may be made to introduce in the metal case 111 using an optical fiber etc.

As shown in drawing 12 - drawing 14, while a third embodiment of <a third embodiment> forms the rectangular pipe-like crevice 212a using the transparent resin board 212, meets the wall surface and arranges LED232 and the photo-transistor 233, The microswitch 214 allocated on the substrate 220 can be projected at the pars basilaris ossis occipitalis, and it has closed at it. In the extraneous light communication interface 240, While having formed the prismatic heights 243 which can be inserted in the crevice 212a concerned, the photo-transistor 242a1 and LED242b1 are allocated in the side of the heights 243 so that LED232 and the photo-transistor 233 may be met in the crevice 212a, Furthermore, the ten key 244a, the handler 244b, the display for indication 244c, etc. which direct ROM dumping are allocated in the main part 244 back.

0028In this embodiment constituted in this way, by the operation of the microswitch 214, CPU221 which is not illustrated detects that the extraneous light communication interface 240 was inserted, and can start dumping automatically.

In the embodiment of which <other embodiment> **** was done, in order to order it ROM dumping, the key switch 13 was used as a dumping commanding means, but the switch for instructions is not necessarily needed.

0029Drawing 15 shows the processing at the time of starting in other embodiments which make such a switch for instructions unnecessary. In the case of this embodiment, the junction state of connectors other than the power supply line which is not illustrated at Step S102 at the time of starting is checked. If it is usual, since it should be connected, each connector will process initialization at Step S100 like the embodiment mentioned above, but when a predetermined connector is removed, ROM dumping is started at Step S104. Since for exclusive use switching etc. will become unnecessary if it does in this way, cost can be lowered. Since ROM dumping is not necessarily carried out each time at the time of the usual starting, it is efficient.

0030In the embodiment mentioned above, although it is made to perform parallel communication for improvement in transmission speed, performing by serial communication of course is also possible. Drawing 16 and drawing 17 show the example which diverts LED 35 and 35 for status displays with which the control substrate box 10 is provided essentially. In this case, when carrying out ROM dumping, the LED 35 and 35 is not used for a status display, but a flicker state is changed according to a communications protocol, and serial transmission is carried out. Under the present circumstances, as long as there is two or more LED 35 and 35, one side may be used for a synchronization. While making LED 35 and 35 set up from the substrate 20 as shown in drawing 17, since it stops requiring a shielding member and a support member, a cost cut can be aimed at by making it enter into the stomata 14 and 14 formed in the metal case 11. Since it becomes difficult to be influenced by an extraneous light, visible light other than infrared rays is also available enough. Serial communication is available also to the side which outputs instructions, and may be made to carry out serial communication of the transmission and reception to it, respectively.

0031The example of composition which simplified the thing of a third embodiment more in

drawing 18 - drawing 20 is shown. in this case, the transparent resin board 312 -- being alike -- it uses, the round hole-like cylinder part 312a is formed, and the end of the cylinder part 312a is in contact with the printed circuit board 320 surface. One LED336 is allocated on the printed circuit board 320, and serial communication is performed as mentioned above. The terminal area 321,321 connected to the printed wiring side on the back via the through hole is formed in both the sides of this LED336, and between the both-ends child parts 321,321 can detect now in switch-on or non-switch-on in game control I/O which is not illustrated.

0032It is the extraneous light communication interface 340 like a light pen which is shown in drawing 20, the photo-transistor 341 is allocated in the center of a tip, and the metal ring 342 is allocated in the apex peripheral edge part. Since the metal ring 342 at a tip makes it flow through between the two terminal areas 321,321 when the extraneous light communication interface 340 which consists only of this optical receiving means is inserted into the above-mentioned cylinder part 312a, Detected in game control I/O, CPU which is not illustrated is judged that dumping instructions were carried out, and starts dumping by serial one side optical communications using LED336 which is an optical transmission means.

0033Also in this example, LED to be used can be managed with one, and since the terminal area 321,321 used as instead of **of a switch** is only printed wiring, it can carry out reduction of the substantial cost extremely. In addition, the transmission unit in remote controls, such as the existing television, etc. can also be used, and while being able to reduce cost by using the existing unit in this case, it becomes easy to give flexibility by both transmission and reception.

Field of the InventionThis invention is used for a pachinko machine etc. and relates to a suitable control substrate box.

Description of the Prior ArtROM which recorded the control program is arranged on the control board of game machines, such as a pachinko machine, and the control board was accommodated in the control substrate box, and is usually sealed so that the contents of this ROM cannot be rewritten. However, since rewriting ROM skillfully is also performed in spite of having sealed, it will be necessary to check the contents of the ROM.

0003In order to check ROM, the sealed control substrate box was opened, ROM was taken out, it set to the ROM writer, and the case of the conventional control substrate box was comparing with regular ROM.

Effect of the InventionAs explained above, this invention can provide the control substrate box which can dump the internal contents of ROM easily without using a connector for exclusive use etc., without opening the seal of various sealing means.

0013

Embodiment of the InventionBelow <a first embodiment> describes the embodiment of this invention based on Drawings. Drawing 1 shows the control substrate box concerning one embodiment of this invention with the top view, and drawing 2 shows the II-II arrowed cross-section figure in drawing 1.

0014In the figure, the control substrate box 10 concerned used for game machines, such as a pachinko machine, is provided with the metal case 11 which unites and forms one housing, and the metal case 11 concerned comprises the upper case 11a and the lower case 11b. The window hole 11a2, the window hole 11a3 for optical communication interfaces mentioned later, and 11a4 are formed so that many slits 11a1 for heat dissipation may be formed in these upper cases 11a and lower cases 11b and it may be easy to look at an inside through a fluoroscope about the upper case 11a. However, the transparent resin board 12 is allocated in the rear-face side of the upper case 11a concerned so that this window hole 11a2, 11a3, and 11a4 may be closed about the upper case 11a. the window hole 11a2 -- a center portion -- the window hole 11a3 and 11a4 -- an upper part right-and-left portion -- as -- it is formed in a total of three places.

0015In this embodiment, although the housing is formed with the metal case 11 and the transparent resin board 12, it is also possible to form the whole by the transparent product

made of resin. In this embodiment, although it is used for a pachinko machine, you may use it for other game machines, such as a slot machine. The metal case 11 has accommodated the substrate 20 which had various kinds of controlling elements arranged to the inside, and is connected to an external sensor and display for indication via the flat cable which is not illustrated. Eight LED32 and the eight photo-transistors 33 are supported by the bridge-like resin support members 31a and 31b by the window hole 11a3 which is on the substrate 20 concerned and was mentioned above, and the position which meets 11a4, respectively. It is connected to the interface circuitry 34 as shown in drawing 3 arranged on the substrate 20, and these LED32 and photo-transistors 33 function as one I/O circuit in CPU21 for control arranged on the above-mentioned substrate 20.

0016In this embodiment, although LED32 and the photo-transistor 33 are separately supported by the individual resin support members 31a and 31b, of course, it can also constitute from a support member of one. In this embodiment, the breakthrough 31a1 and 31b1 were formed in the resin support members 31a and 31b, and into it, as impossible ON ** was carried out, LED32 and the photo-transistor 33 are accommodated. Therefore, the error is made hard to hold the tracking of light and to produce in commo data, while keeping the excessive scattered light from a lower part, etc. from entering at least.

0017On the other hand, it is equipped also with game control I/O23 connected to the sensor of the exterior mentioned above with ROM22 which recorded the program for control to the above-mentioned CPU21, or a display on the substrate 20. In here, the program for control recorded on the ROM22 is shown in the flow chart of drawing 4, and fundamentally, After initializing at Step S100, the detecting signal of a sensor etc., etc. are inputted from game control I/O23 at Step S110, Control at Step S120 according to it was performed, and processing in which a control signal is outputted to a display for indication, an accessory, etc. via the game control I/O23 at Step 130 is repeated.

0018The key switch 13 is connected to the metal case 11, and after starting, CPU21 detects the rotation position of the key switch 13, and changes some parameters. If a prescribed position is made to rotate this key switch 13, ROM dumping instructions are meant. CPU21 performs optical-communications processing shown in drawing 5, when it detects that they are ROM dumping instructions according to the rotary place of the key switch 13, but before it explains this optical-communications processing, it explains the extraneous light communication interface 40 shown in drawing 6 and drawing 7.

0019The extraneous light communication interface 40 is formed in the outline T type which formed the oblong head section 42 at the tip of the longwise grip part 41, The outputting part 42b which met the photo-transistor 33 on the input part 42a which met the head section 42 LED32 on the above-mentioned substrate 20, and has arranged the photo-transistor, and the above-mentioned substrate 20, and has been arranged is formed. each input part 42a and outputting part 42b corresponded to the window hole 11a3 of the above-mentioned upper case 11a, and 11a4 -- it has projected a little, it enters into the window hole 11a3 and 11a4 by the thickness of the upper case 11a, and alignment is easy. Of course, the eight photo-transistors 42a1 are arranged at the input part 42a, and eight LED42b1 is arranged at the outputting part 42b.

0020Of course, it is connected to the computer etc. which are not illustrated and this extraneous light communication interface 40 can communicate. LED32 mentioned above, 42b1, and the photo-transistor 33 and 42a1 make it hard to malfunction with visible light Lighting Sub-Division of a hole by emitting for it light and receiving infrared light in this embodiment. Next, operation of this embodiment which consists of the above-mentioned composition is explained. A worker does alignment of the input part 42a and the outputting part 42b to the window hole 11a3 which formed the extraneous light communication interface 40 in the upper case 11a of the metal case 11, and 11a4 to see the contents of ROM, and makes the support position of ROM dumping rotate the key switch 13.

0021On the other hand, although CPU21 is performing the main loop processings as shown in drawing 4 at the time of usual, if it detects that the key switch 13 rotated into the support position of ROM dumping, optical-communications processing shown in drawing 5 will be performed. CPU21 becomes command standby at Step S210 after starting of this optical-communications processing. Command standby transmits the lightwave signal showing a command by making LED42b1 of the outputting part 42b emit light so that the extraneous light communication interface 40 which stands by and mentioned above that a lightwave signal was inputted via the interface circuitry 34 may satisfy a predetermined protocol. Then, the photo-transistor 33 detects flicker of LED42b1, it is turned on and off suitably, and the interface

circuitry 34 outputs this to CPU21.

0022CPU21 will analyze the command which it expresses with Step S220, if the on-off situation of the photo-transistor 33 is inputted from the interface circuitry 34. The command itself means a dumping demand, and also it also means the check request of I/O, in a dumping demand, is still more possible also for a total range, and possible also in some addressed ranges.

Therefore, when it judges whether a dumping demand is first expressed with Step S230 and the analyzed command expresses a dumping demand, a total range or a designated range is further judged at Step S240. When a total range is specified, dumping is outputted at Step S250, and when addressed, only a designated range is dumped at Step S260.

0023When dumping, CPU21 reads the contents of ROM22 and makes LED32 emit light so that it may become a predetermined protocol via the interface circuitry 34. Then, the photo-transistor 42a1 of the input part 42a in the extraneous light communication interface 40 is turned on and off according to flicker of LED32, and notifies the situation to an external computer. And if a notice is completed, acknowledgement will be outputted via the outputting part 42b, and CPU21 reads the contents of the next address of ROM22 while receiving the acknowledgement like the time of command input. Hereafter, dumping of ROM22 is performed by repeating this. Of course, specifying a total range means all the addresses of ROM22, and addressing means specifying the address of ROM22.

0024Thus, while connecting LED32 and the photo-transistor 33 via the interface circuitry 34 on the substrate 20, accommodating the substrate 20 equipped with ROM22 with the metal case 11, Since the interface circuitry 34 was connected to CPU21 connected to the above-mentioned ROM22, If a predetermined dumping demand command is transmitted to the photo-transistor 33 from the extraneous light communication interface 40, CPU21 will read the contents of the ROM22 in optical-communications processing, Dumping of the contents of ROM22 can be obtained easily, without being able to transmit to the above-mentioned extraneous light communication interface 40, and opening the metal case 11, or using a connector for exclusive use via LED32.

0025When the command analyzed at Step S220 means an I/O check, CPU21 performs an I/O check at Step S270 through judgment of Step S230. In this I/O check, CPU21 checks various kinds of sensors and the operation situation of a display for indication via game control I/O23, and outputs a checked result outside from the interface circuitry 34 like ROM dumping at Step S280. Of course, this I/O check is expedient, and although it is not necessarily required, such use is also possible besides ROM dumping.

0026<A second embodiment> Although hollow support of LED32 and the photo-transistor 33 linked to the interface circuitry 34 is carried out with the resin board 12 transparent rear face by the resin support members 31a and 31b in a first embodiment mentioned above, In a second embodiment shown in drawing 8 and drawing 9, LED132 and the photo-transistor 133 are mostly allocated on the substrate 120. However, these LED132 and photo-transistors 133 are allocated along with two or more slits 111a1 formed in the upper case 111a, Corresponding to this, the input part 142a and the outputting part 142b of the extraneous light communication interface 140 are formed in tabular **which can be inserted in the slit 111a1 / of two sheets / parallel**, as shown in drawing 10. In this case, as shown in drawing 11, the input part 142a and the outputting part 142b are formed in tubed **in the air**, the tip of a barrel contacts LED132 on the substrate 120, and the photo-transistor 133 -- exactly -- ***** -- it is like and the photo-transistor 142a1 and LED142b1 corresponding to the back end are held.

0027Although the actual operation in this embodiment is the same as that of a first embodiment, the input part 142a and the outputting part 142b are inserted in the slit 111a1, and since position immobilization can be carried out, dumping becomes easy. Although the input part 142a and the outputting part 142b are formed in tabular in this embodiment, it may be made to introduce in the metal case 111 using an optical fiber etc.

As shown in drawing 12 - drawing 14, while a third embodiment of <a third embodiment> forms the rectangular pipe-like crevice 212a using the transparent resin board 212, meets the wall surface and arranges LED232 and the photo-transistor 233, The microswitch 214 allocated on the substrate 220 can be projected at the pars basilaris ossis occipitalis, and it has closed at it. In the extraneous light communication interface 240, While having formed the prismatic heights 243 which can be inserted in the crevice 212a concerned, the photo-transistor 242a1 and LED242b1 are allocated in the side of the heights 243 so that LED232 and the photo-transistor 233 may be met in the crevice 212a, Furthermore, the ten key 244a, the handler 244b, the display for indication 244c, etc. which direct ROM dumping are allocated in the main

part 244 back.

0028In this embodiment constituted in this way, by the operation of the microswitch 214, CPU221 which is not illustrated detects that the extraneous light communication interface 240 was inserted, and can start dumping automatically.

In the embodiment of which <other embodiment> **** was done, in order to order it ROM dumping, the key switch 13 was used as a dumping commanding means, but the switch for instructions is not necessarily needed.

0029Drawing 15 shows the processing at the time of starting in other embodiments which make such a switch for instructions unnecessary. In the case of this embodiment, the junction state of connectors other than the power supply line which is not illustrated at Step S102 at the time of starting is checked. If it is usual, since it should be connected, each connector will process initialization at Step S100 like the embodiment mentioned above, but when a predetermined connector is removed, ROM dumping is started at Step S104. Since for exclusive use switching etc. will become unnecessary if it does in this way, cost can be lowered. Since ROM dumping is not necessarily carried out each time at the time of the usual starting, it is efficient.

0030In the embodiment mentioned above, although it is made to perform parallel communication for improvement in transmission speed, performing by serial communication of course is also possible. Drawing 16 and drawing 17 show the example which diverts LED 35 and 35 for status displays with which the control substrate box 10 is provided essentially. In this case, when carrying out ROM dumping, the LED 35 and 35 is not used for a status display, but a flicker state is changed according to a communications protocol, and serial transmission is carried out. Under the present circumstances, as long as there is two or more LED 35 and 35, one side may be used for a synchronization. While making LED 35 and 35 set up from the substrate 20 as shown in drawing 17, since it stops requiring a shielding member and a support member, a cost cut can be aimed at by making it enter into the stomata 14 and 14 formed in the metal case 11. Since it becomes difficult to be influenced by an extraneous light, visible light other than infrared rays is also available enough. Serial communication is available also to the side which outputs instructions, and may be made to carry out serial communication of the transmission and reception to it, respectively.

0031The example of composition which simplified the thing of a third embodiment more in drawing 18 - drawing 20 is shown. in this case, the transparent resin board 312 -- being alike -- it uses, the round hole-like cylinder part 312a is formed, and the end of the cylinder part 312a is in contact with the printed circuit board 320 surface. One LED336 is allocated on the printed circuit board 320, and serial communication is performed as mentioned above. The terminal area 321,321 connected to the printed wiring side on the back via the through hole is formed in both the sides of this LED336, and between the both-ends child parts 321,321 can detect now in switch-on or non-switch-on in game control I/O which is not illustrated.

0032It is the extraneous light communication interface 340 like a light pen which is shown in drawing 20, the photo-transistor 341 is allocated in the center of a tip, and the metal ring 342 is allocated in the apex peripheral edge part. Since the metal ring 342 at a tip makes it flow through between the two terminal areas 321,321 when the extraneous light communication interface 340 which consists only of this optical receiving means is inserted into the above-mentioned cylinder part 312a, Detected in game control I/O, CPU which is not illustrated is judged that dumping instructions were carried out, and starts dumping by serial one side optical communications using LED336 which is an optical transmission means.

0033Also in this example, LED to be used can be managed with one, and since the terminal area 321,321 used as instead of **of a switch** is only printed wiring, it can carry out reduction of the substantial cost extremely. In addition, the transmission unit in remote controls, such as the existing television, etc. can also be used, and while being able to reduce cost by using the existing unit in this case, it becomes easy to give flexibility by both transmission and reception.

Problem(s) to be Solved by the Invention In the conventional control substrate box mentioned above, since the control substrate box had to be opened and removal took time and effort in order to check ROM, since it is sealed by various sealing means, SUBJECT that a check took time occurred. On the other hand, although it is not technically impossible to provide a terminal for exclusive use for a check, either, since it will be easy to be used unjustly if a terminal for exclusive use is provided, a terminal for exclusive use cannot be used.

0005This invention was made in view of the aforementioned problem, and aims at offer of the control substrate box which can dump the contents of the ROM easily.

Means for Solving the ProblemIn order to attain the above-mentioned purpose, an invention concerning Claim 1, An optical communication interface for being a control substrate box in which a control board provided with ROM which recorded a control program of a game machine is accommodated, and carrying out optical communications to the exterior, It has composition possessing a ROM dumping means to output a dumping result via the optical communication interface to a dumping demand of the above-mentioned ROM.

0007In an invention concerning Claim 1 constituted as mentioned above, While having accommodated a control board provided with ROM which recorded a control program of a game machine in a control substrate box, The exterior and optical communications have become possible with an optical communication interface, and a ROM dumping means will output a dumping result via the above-mentioned optical communication interface, if a dumping demand of ROM is inputted. That is, it becomes possible to read ROM inside a control substrate box externally by optical communications, and it is not necessary to open a control substrate box or to adopt a connector.

0008Various kinds of composition is possible, and it is provided with light emitting devices, such as LED, at least, and if an output of data is outside possible for an optical communication interface, it is good. In this case, it may be made to use infrared rays other than visible light, etc. so that data mistaken in the light-receiving side may not be outputted. Of course, about a type of output of data, it can change suitably outputting serial, or it being parallel, and outputting, or outputting in a special format etc. This optical communication interface is available also as an input means. That is, a dumping demand of ROM may be made to input via the optical communication interface concerned, and the dumping range of ROM, etc. may be made to input.

0009A gestalt of an optical communication interface may arrange LED etc. on a substrate, or from a substrate to the control substrate box surface, as it floats, it may be arranged. In this case, what is necessary is to make the transparent window section rear face concerned approach, to arrange, and just to have composition which sends and receives a lightwave signal via a transparent window section, since a transparent window section made of resin is formed in the control substrate box itself in many cases. If it does in this way, it will agree also in a future tendency for you to make it abbreviated-seal the control substrate box itself by various sealing means. If unevenness is formed around such a transparent window section, it will become easy to carry out alignment of the optical communication interface of an outer side.

0010It usually comes out that a slit for heat dissipation is formed in a control substrate box, and it may be made to, insert an optical communication interface of an outer side via the slit concerned on the other hand for a certain reason. In this case, what is necessary is just to allocate the above-mentioned LED on a substrate, and it becomes easy to manufacture it. An optical communication interface of an outer side inserted via a slit also has a merit that alignment can be carried out by the slit concerned. While establishing a crevice for exclusive use in a control substrate box, facing an inside of the crevice concerned and arranging LED of an optical communication interface, etc., An optical communication interface of an outer side may be made to make a photo detector a position which meets the LED eight while forming heights which can be inserted into the crevice concerned. In this case, a switch is allocated in a recessed bottom face, and if it is made for the switch to serve as one when an optical communication interface of an outer side is inserted into the crevice concerned, a dumping demand of ROM can be emitted at the time of insertion.

0011On the other hand, via the above-mentioned optical communication interface, the ROM dumping means should just be ability ready for sending, for example, should just constitute the contents of the ROM with CPU for control, its control program, etc. It may have a switch and a handler, in order to input a dumping demand of ROM, and it may be made to transmit and receive this ROM dumping demand itself via an optical communication interface, as mentioned above. Of course, a read circuit for exclusive use is formed, by operating a switch, CPU for game control may be stopped and dumping may be performed.

Brief Description of the Drawings

Drawing 1 It is a top view of the control substrate box concerning one embodiment of this invention.

Drawing 2 It is an II-II line arrowed cross-section figure of the control substrate box.

Drawing 3 It is a schematic block diagram of the control substrate box.

Drawing 4 It is a flow chart of the main routine of the control substrate box.

Drawing 5 It is a flow chart of optical-communications processing of the control substrate box.

Drawing 6 It is a perspective view on the side front of the extraneous light communication interface corresponding to the control substrate box.

Drawing 7 It is a perspective view on the back side of the extraneous light communication interface corresponding to the control substrate box.

Drawing 8 It is a top view of the control substrate box concerning other embodiments.

Drawing 9 It is an IX-IX line arrowed cross-section figure of the control substrate box.

Drawing 10 It is a perspective view on the side front of the extraneous light communication interface corresponding to the control substrate box.

Drawing 11 It is a sectional view of the extraneous light communication interface corresponding to the control substrate box.

Drawing 12 It is a perspective view of the control substrate box concerning other embodiments.

Drawing 13 It is a perspective view on the side front of the extraneous light communication interface corresponding to the control substrate box.

Drawing 14 It is a XIV-XIV line arrowed cross-section figure of the control substrate box.

Drawing 15 It is a flow chart of the starting processing concerning a modification.

Drawing 16 It is a fragmentary perspective view of the control substrate box concerning a modification.

Drawing 17 It is a fragmentary sectional view of the control substrate box concerning the modification.

Drawing 18 It is a fragmentary perspective view of the control substrate box concerning other modifications.

Drawing 19 It is a sectional view of the control substrate box concerning the modification.

Drawing 20 It is a perspective view of the extraneous light communication interface corresponding to the modification.

Description of Notations

10 -- Control substrate box

11 -- Metal case

12 -- Resin board

13 -- Key switch

20 -- Substrate

21 -- CPU

22 -- ROM

31a, 31b -- Resin support member

32 -- LED

33 -- Photo-transistor

34 -- Interface circuitry

40 -- Extraneous light communication interface

42a -- Input part

42b -- Outputting part

111 -- Metal case

111a1 -- Slit

132 -- LED

133 -- Photo-transistor

140 -- Extraneous light communication interface

142a -- Input part

142b -- Outputting part

212 -- Resin board

212a -- Crevice

214 -- Microswitch

221 -- CPU

232 -- LED

233 -- Photo-transistor

243 -- Heights
244 -- Main part
312 -- Transparent resin board
312a -- Cylinder part
320 -- Printed circuit board
321,321 -- Terminal area
336 -- LED
340 -- Extraneous light communication interface
341 -- Photo-transistor
342 -- Metal ring

Drawing 2

For drawings please refer to the original document.

Drawing 4

For drawings please refer to the original document.

Drawing 1

For drawings please refer to the original document.

Drawing 3

For drawings please refer to the original document.

Drawing 5

For drawings please refer to the original document.

Drawing 6

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Drawing 7

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Drawing 8

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Drawing 9

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Drawing 10

For drawings please refer to the original document.

Drawing 11

For drawings please refer to the original document.

Drawing 12

For drawings please refer to the original document.

Drawing 13

For drawings please refer to the original document.

Drawing 14

For drawings please refer to the original document.

Drawing 15

For drawings please refer to the original document.

Drawing 16

For drawings please refer to the original document.

Drawing 17

For drawings please refer to the original document.

Drawing 18

For drawings please refer to the original document.

Drawing 19

For drawings please refer to the original document.

Drawing 20

For drawings please refer to the original document.

For drawings please refer to the original document.

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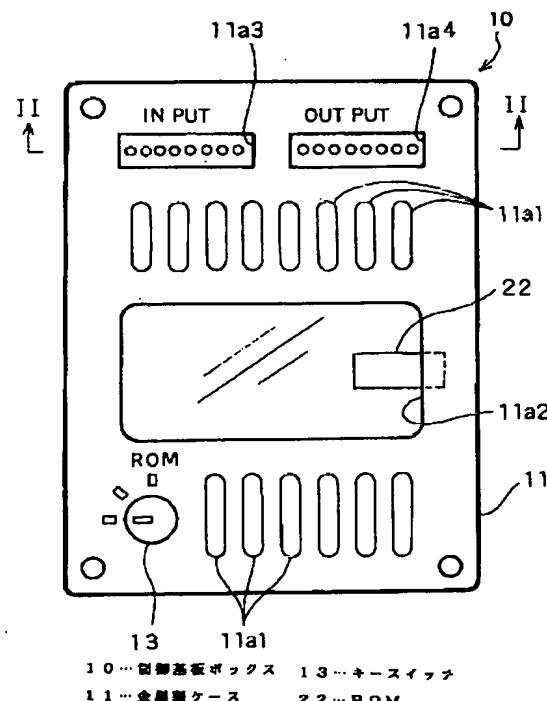
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(54)【発明の名称】 制御基板ボックス

(57)【要約】

【課題】 ROMのチェックをするためには制御基板ボックスを開封しなければならなかった。

【解決手段】 ROM22を装着した基板20を金属製ケース11にて収容しつつ、同基板20上にはインターフェイス回路34を介してLED32とフォトトランジスタ33とを接続するとともに、同インターフェイス回路34は上記ROM22に接続されたCPU21に接続したので、外部光通信インターフェイス40より所定のダンプ要求コマンドをフォトトランジスタ33に送信するとCPU21は光通信処理の中で同ROM22の内容を読み出し、LED32を介して上記外部光通信インターフェイス40に送信することができ、金属製ケース11を開封したり、専用のコネクタを使用することなく容易にROM22の内容のダンプを得ることができる。



【特許請求の範囲】

【請求項1】遊戯機の制御プログラムを記録したROMを備えた制御基板を収容する制御基板ボックスであって、外部と光通信するための光通信インターフェイスと、上記ROMのダンプ要求に対して同光通信インターフェイスを介してダンプ結果を出力するROMダンプ手段とを具備することを特徴とする制御基板ボックス。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、パチンコ機などに使用して好適な制御基板ボックスに関する。

【0002】

【従来の技術】パチンコ機などの遊戯機の制御基板上には制御プログラムを記録したROMが配置されており、通常、このROMの内容を書き換えることができないように制御基板を制御基板ボックスに収容して封印している。しかしながら、封印しているにもかかわらず巧妙にROMを書き換えることも行われるため、ROMの内容をチェックする必要が生じる。

【0003】従来の制御基板ボックスの場合、ROMをチェックするためには封印した制御基板ボックスを開封し、ROMを取り出してROMライターにセットして正規のROMと比較していた。

【0004】

【発明が解決しようとする課題】上述した従来の制御基板ボックスにおいては、各種封印手段により封印されているためROMのチェックをするために制御基板ボックスを開封しなければならず、取り外しに手間がかかるのでチェックに時間を要するという課題があった。一方、チェックのために専用の端子を設けることも技術的には不可能ではないが、専用の端子を設けると不正に使用されやすいので、専用の端子は使用できない。

【0005】本発明は、上記課題にかんがみてなされたもので、ROMの内容を容易にダンプすることが可能な制御基板ボックスの提供を目的とする。

【0006】

【課題を解決するための手段】上記目的を達成するため、請求項1にかかる発明は、遊戯機の制御プログラムを記録したROMを備えた制御基板を収容する制御基板ボックスであって、外部と光通信するための光通信インターフェイスと、上記ROMのダンプ要求に対して同光通信インターフェイスを介してダンプ結果を出力するROMダンプ手段とを具備する構成としてある。

【0007】上記のように構成した請求項1にかかる発明においては、制御基板ボックス内に遊戯機の制御プログラムを記録したROMを備えた制御基板を収容しているとともに、光通信インターフェイスによって外部と光通信可能となっており、ROMダンプ手段はROMのダンプ要求が入力されると上記光通信インターフェイスを介してダンプ結果を出力する。すなわち、光通信で制御

基板ボックスの内部のROMを外部にて読み出すことが可能となり、制御基板ボックスを開封したり、コネクタを採用する必要はない。

【0008】光通信インターフェイスは各種の構成が可能であり、少なくともLEDなどの発光素子を備えて外部にデータを出力可能であればよい。この場合、受光側に誤ったデータを出力しないように可視光以外の赤外線などを利用するようにしても良い。むろん、データの出力方式については、シリアルで出力したり、パラレルで出力したり、特殊フォーマットで出力するなど適宜変更可能である。また、この光通信インターフェイスは入力手段としても利用可能である。すなわち、当該光通信インターフェイスを介してROMのダンプ要求を入力せしめてもよいし、また、ROMのダンプ範囲などを入力させても良い。

【0009】光通信インターフェイスの形態は基板上にLEDなどを配置させても良いし、あるいは基板上から制御基板ボックス表面まで浮かせるようにして配置しても良い。この場合、制御基板ボックス自体には樹脂製の透明窓部が形成されていることが多いので、当該透明窓部裏面に近接せしめて配置しておき、透明窓部を介して光信号を送受する構成とすればよい。このようにすれば制御基板ボックス自体を各種封印手段により略密閉せようとする今後の傾向にも合致する。また、このような透明窓部の周辺に凹凸を形成しておけば外部側の光通信インターフェイスを位置合わせしやすくなる。

【0010】一方、制御基板ボックスには放熱用のスリットが形成されるのが通常であるため、当該スリットを介して外部側の光通信インターフェイスを挿入するようにしても良い。この場合、上記LEDなどは基板上に配設すればよく、製造が容易となる。また、スリットを介して挿入する外部側の光通信インターフェイスは当該スリットによって位置合わせできるというメリットもある。さらに、制御基板ボックスに専用の凹部を設け、光通信インターフェイスのLEDなどを当該凹部内部に面して配置するとともに、外部側の光通信インターフェイスは当該凹部内に挿入可能な凸部を形成するとともに受光素子を同LEDに対面する位置に八するようにしても良い。この場合、凹部底面にスイッチを配設しておき、外部側の光通信インターフェイスを当該凹部内に挿入したときに同スイッチがオンとなるようにすれば、挿入時にROMのダンプ要求を発するようにすることもできる。

【0011】一方、ROMダンプ手段はROMの内容を上記光通信インターフェイスを介して送信可能であればよく、例えば、制御用CPUとその制御プログラムなどによって構成すればよい。また、ROMのダンプ要求を入力するためにはスイッチや操作子を備えても良いし、上述したようにかかるROMダンプ要求自体を光通信インターフェイスを介して送受信するようにしても良い。む

ろん、専用の読出回路を形成しておき、スイッチを操作することによって遊技制御用CPUを停止させ、ダンプを実行するなどしても良い。

【0012】

【発明の効果】以上説明したように本発明は、各種封印手段の封印を開封することなく、また、専用のコネクタなどを使用しないで内部のROM内容を容易にダンプすることができる制御基板ボックスを提供することができる。

【0013】

【発明の実施の形態】<第一実施形態>以下、図面にもとづいて本発明の実施形態を説明する。図1は、本発明の一実施形態にかかる制御基板ボックスを平面図により示しており、図2は図1におけるII-II矢視断面図を示している。

【0014】同図において、パチンコ機などの遊技機に使用される当該制御基板ボックス10は、合体して一つの筐体を形成する金属製ケース11を備えており、当該金属製ケース11は上ケース11aと下ケース11bとから構成されている。これらの上ケース11aと下ケース11bには放熱用のたくさんのスリット11a1などが形成され、また、上ケース11aについては内部を透視しやすいように窓穴11a2と後述する光通信インターフェイス用の窓穴11a3, 11a4が形成されている。ただし、上ケース11aについてはこの窓穴11a2, 11a3, 11a4を塞ぐように当該上ケース11aの裏面側に透明の樹脂板12を配設してある。なお、窓穴11a2は中央部分に、窓孔11a3, 11a4は上方左右部分にというように合計三ヶ所に形成されている。

【0015】なお、本実施形態においては、金属製ケース11と透明の樹脂板12とで筐体を形成しているが、全体を透明の樹脂製で形成するということも可能である。また、本実施形態においては、パチンコ機に使用しているが、スロットマシンなどの他の遊技機に使用しても構わない。金属製ケース11は、その内部に各種の制御素子を配置された基板20を収容しており、図示しないフラットケーブルを介して外部のセンサや表示器に接続されている。また、当該基板20上であって上述した窓穴11a3, 11a4に対面する位置にはブリッジ状の樹脂性支持部材31a, 31bによってそれぞれ八つのLED32と八つのフォトトランジスタ33とが支持されている。これらのLED32とフォトトランジスタ33は基板20上に配置された図3に示すようなインターフェイス回路34に接続されており、上記基板20上に配置された制御用のCPU21における一つのI/O回路として機能する。

【0016】なお、本実施形態においては、個別の樹脂性支持部材31a, 31bによってLED32とフォトトランジスタ33とを別個に支持しているが、むろん一

体の支持部材で構成することもできる。また、本実施形態においては、樹脂性支持部材31a, 31bに貫通孔31a1, 31b1を形成し、その中に無理入れするようにしてLED32とフォトトランジスタ33とを収容している。従って、少なくとも下方からの余分な散乱光などが入り込まないようにするとともに光の直進性を保持して通信データに誤りが生じにくくしている。

【0017】一方、基板20上には上記CPU21に対して制御用のプログラムを記録したROM22とともに上述した外部のセンサや表示に接続される遊技制御I/O23も装着されている。ここにおいて、同ROM22に記録された制御用のプログラムを図4のフローチャートに示しており、基本的には、ステップS100にて初期化した後、ステップS110にて遊技制御I/O23からセンサなどの検出信号などを入力し、ステップS120にてそれに応じた制御を実行し、ステップ130にて同遊技制御I/O23を介して表示器や役物などに制御信号を出力するという処理を繰り返している。

【0018】なお、金属製ケース11にはキースイッチ13が接続されており、CPU21は起動後に同キースイッチ13の回転ポジションを検出して一部のパラメータを変更するようになっている。また、このキースイッチ13を所定位置に回転させるとROMダンプ指令を意味する。CPU21はキースイッチ13の回転位置に応じてROMダンプ指令であると検出した場合、図5に示す光通信処理を実行するが、かかる光通信処理を説明する前に図6および図7に示す外部光通信インターフェイス40について説明する。

【0019】外部光通信インターフェイス40は、縦長のグリップ部41の先端に横長のヘッド部42を形成した概略T字形に形成されており、ヘッド部42には上記基板20上のLED32に対面してフォトトランジスタを配置した入力部42aと上記基板20上のフォトトランジスタ33に対面して配置した出力部42bとが形成されている。それぞれの入力部42aと出力部42bは上記上ケース11aの窓穴11a3, 11a4に対応したやや突出しており、上ケース11aの厚み分だけ窓穴11a3, 11a4に入り込んで位置合わせが容易となっている。むろん入力部42aには八つのフォトトランジスタ42a1が配置され、出力部42bには八つのLED42b1が配置されている。

【0020】むろん、この外部光通信インターフェイス40は図示しないコンピュータなどに接続されて通信可能なとなっている。なお、本実施形態においては、上述したLED32, 42b1やフォトトランジスタ33, 42a1は赤外線光を発光及び受光することにより、ホールの可視光照明によって誤動作しにくくしている。次に、上記構成からなる本実施形態の動作を説明する。作業者はROM内容を見たい場合に外部光通信インターフェイス40を金属製ケース11の上ケース11aに形成

した窓穴11a3, 11a4に入力部42aと出力部42bとを位置合わせし、キースイッチ13をROMダンプの支持ポジションに回転させる。

【0021】一方、通常時、CPU21は図4に示すようなメインのループ処理を実行しているが、キースイッチ13がROMダンプの支持ポジションに回転されたことを検出すると、図5に示す光通信処理を実行する。この光通信処理の起動後、CPU21はステップS210にてコマンド待機となる。コマンド待機はインターフェイス回路34を介して光信号が入力されるのを待機するものであり、上述した外部光通信インターフェイス40が所定のプロトコールを満足するように出力部42bのLED42b1を発光させることにより、コマンドを表す光信号を送信する。すると、LED42b1の明滅をフォトトランジスタ33が検知して適宜オン・オフとなり、これをインターフェイス回路34がCPU21に出力する。

【0022】CPU21はインターフェイス回路34からフォトトランジスタ33のオン・オフ状況を入力すると、ステップS220にてそれが表すコマンドを解析する。コマンド自体はダンプ要求を意味する他、I/Oのチェック要求も意味するようになっており、さらにダンプ要求の場合には全範囲も可能であるし、アドレス指定した一部の範囲でも可能となっている。従って、先ずステップS230にてダンプ要求を表すか否かを判断し、解析したコマンドがダンプ要求を表す場合は、さらにステップS240にて全範囲か指定範囲かを判断する。全範囲を指定された場合、ステップS250にてダンプを出し、アドレス指定されている場合にはステップS260にて指定範囲だけダンプする。

【0023】ダンプする場合、CPU21はROM22の内容を読み出し、インターフェイス回路34を介して所定のプロトコルとなるようにLED32を発光させる。すると、外部光通信インターフェイス40における入力部42aのフォトトランジスタ42a1がLED32の明滅に応じてオン・オフとなり、外部のコンピュータにその状況を通知する。そして通知が完了したら出力部42bを介してアクノリッジを出し、CPU21はコマンド入力時と同様にしてそのアクノリッジを受信するとともに、ROM22の次のアドレスの内容を読み出す。以下、これを繰り返すことにより、ROM22のダンプを実行する。むろん、全範囲を指定するというのはROM22の全アドレスを意味するものであり、アドレス指定するというのはROM22のアドレスを指定することを意味している。

【0024】このように、ROM22を装着した基板20を金属製ケース11にて収容しつつ、同基板20上にはインターフェイス回路34を介してLED32とフォトトランジスタ33とを接続するとともに、同インターフェイス回路34は上記ROM22に接続されたCPU

21に接続したので、外部光通信インターフェイス40より所定のダンプ要求コマンドをフォトトランジスタ33に送信するとCPU21は光通信処理の中で同ROM22の内容を読み出し、LED32を介して上記外部光通信インターフェイス40に送信することができ、金属製ケース11を開封したり、専用のコネクタを使用することなく容易にROM22の内容のダンプを得ることができる。

【0025】なお、ステップS220にて解析したコマンドがI/Oチェックを意味する場合、ステップS230の判断を経てCPU21はステップS270にてI/Oチェックを実行する。このI/OチェックではCPU21は遊戯制御I/O23を介して各種のセンサや表示器の動作状況をチェックし、ステップS280にてチェック結果をROMダンプと同様にしてインターフェイス回路34より外部に出力する。むろん、このI/Oチェックは便宜的なものであり、必ずしも必要ではないが、ROMダンプ以外にもこのような利用も可能である。

【0026】<第二実施形態>上述した第一実施形態においては、インターフェイス回路34に接続するLED32やフォトトランジスタ33を樹脂性支持部材31a, 31bにて透明の樹脂板12裏面にて中空支持させているが、図8及び図9に示す第二実施形態においてはほぼ基板120上にLED132やフォトトランジスタ133を配設している。ただし、これらのLED132やフォトトランジスタ133は上ケース111aに形成した複数のスリット111a1に沿って配設されており、これに対応して外部光通信インターフェイス140の入力部142aと出力部142bは、図10に示すように同スリット111a1に挿入可能な二枚の平行な板状に形成されている。この場合、図11に示すように入力部142aと出力部142bは中空の筒状に形成され、筒体の先端が基板120上のLED132やフォトトランジスタ133に当接してちょうどは入り込むようになっており、後端には対応するフォトトランジスタ142a1やLED142b1が保持されている。

【0027】本実施形態における実際の作用は第一実施形態と同様であるが、スリット111a1に入力部142aと出力部142bを挿入して位置固定できるため、ダンプ作業が容易になる。なお、本実施形態においては入力部142aと出力部142bを板状に形成しているが、光ファイバなどを使って金属製ケース111内に導入するようにしても良い。

<第三実施形態>第三実施形態は、図12～図14に示すように、透明の樹脂板212を利用して角筒状の凹部212aを形成し、その側壁面に對面してLED232とフォトトランジスタ233を配置してあるとともに、その底部には基板220上に配設したマイクロスイッチ214を突出せしめてある。また、外部光通信インターフェイス240においては、当該凹部212aに挿入可

能な角柱状の凸部243を形成してあるとともに同凸部243の側面には凹部312a内にてLED232とフォトトランジスタ233と対面するようにフォトトランジスタ242a1やLED242b1を配設し、さらに本体244背面にはROMダンプを指示するテンキー244aや操作子244bや表示器244cなどを配設してある。

【0028】このように構成した本実施形態においては、図示しないCPU221がマイクロスイッチ214の作動によって外部光通信インターフェイス240が挿入されたことを検知し、自動的にダンプを開始するようになる。

＜その他の実施形態＞上述した実施形態においては、ROMダンプを指令するためにダンプ指令手段としてキースイッチ13を使用していたが、必ずしも指令用のスイッチを必要とするわけではない。

【0029】図15は、このような指令用のスイッチを不要とする他の実施形態における起動時の処理を示している。この実施形態の場合、起動時にステップS102にて図示しない電源供給線以外のコネクタの接続状況をチェックしてみる。通常であれば各コネクタは接続されているはずであるから、上述した実施形態と同様にステップS100にて初期化の処理を実施するが、所定のコネクタを外しておいた場合には、ステップS104にてROMダンプを開始する。このようにすれば、専用のスイッチなどが不要となるので、コストを下げることができる。また、通常の起動時に毎回ROMダンプするわけではないので効率的である。

【0030】上述した実施形態においては、通信速度の向上のためにパラレル通信を実行するようにしているが、むろんシリアル通信で実行することも可能である。また、図16および図17は本来の制御基板ボックス10が備えているステータス表示用のLED35、35を流用する例を示している。この場合、ROMダンプするときには同LED35、35をステータス表示に使用するのではなく、通信プロトコルに合わせて明滅状態を変化させてシリアル送信する。この際、複数のLED35、35があるのであれば、一方を同期用に使用しても良い。また、図17に示すように基板20からLED35、35を立設せしめるとともに、金属製ケース11に形成した小孔14、14に入り込ませることにより、遮光部材や支持部材を要しなくなるのでコストダウンをはかれる。さらに、外部光の影響を受けにくくなるので赤外線以外の可視光でも十分利用可能である。なお、シリアル通信は指令を出力する側にも利用可能であり、送受信をそれぞれシリアル通信するようにしても良い。

【0031】また、図18～図20においては第三実施形態のものをより簡易化した構成例を示している。この場合、透明の樹脂板312をには利用して丸孔状の筒部312aを形成しており、同筒部312aの端部はプリ

ント基板320表面に当接している。プリント基板320上には一つのLED336を配設しており、前述したようにシリアル通信を行う。また、このLED336の両脇にはスルーホールを介して裏面のプリント配線側に接続された端子部321、321を形成しており、図示しない遊技制御I/Oにて両端子部321、321間が導通状態か非導通状態か検知できるようになっている。

【0032】図20に示すのはライトペンのような外部光通信インターフェイス340であり、先端中央にフォトトランジスタ341が配設され、先端周縁部には金属リング342が配設してある。かかる光受信手段のみからなる外部光通信インターフェイス340を上記筒部312a内に挿入すると、先端の金属リング342が二つの端子部321、321間を導通させるので、遊技制御I/Oにて検知され、図示しないCPUはダンプ指令されたものと判断して光送信手段であるLED336を使用してシリアル一方光通信によるダンプを開始する。

【0033】この例においても、使用するLEDは一つで済むし、スイッチの代わりとなる端子部321、321はプリント配線に過ぎないので実質的なコストは極めて低減化できる。この他、既存のテレビなどのリモコンにおける送信ユニットなどを利用することもでき、この場合には既存のユニットを利用することによってコストを低減できるとともに、送受信の両方で汎用性を持たせやすくなる。

【図面の簡単な説明】

【図1】本発明の一実施形態にかかる制御基板ボックスの平面図である。

【図2】同制御基板ボックスのII-II線矢視断面図である。

【図3】同制御基板ボックスの概略ブロック図である。

【図4】同制御基板ボックスのメインルーチンのフローチャートである。

【図5】同制御基板ボックスの光通信処理のフローチャートである。

【図6】同制御基板ボックスに対応した外部光通信インターフェイスの表側の斜視図である。

【図7】同制御基板ボックスに対応した外部光通信インターフェイスの裏側の斜視図である。

【図8】他の実施形態にかかる制御基板ボックスの平面図である。

【図9】同制御基板ボックスのIX-IX線矢視断面図である。

【図10】同制御基板ボックスに対応した外部光通信インターフェイスの表側の斜視図である。

【図11】同制御基板ボックスに対応した外部光通信インターフェイスの断面図である。

【図12】他の実施形態にかかる制御基板ボックスの斜視図である。

【図13】同制御基板ボックスに対応した外部光通信イ

ンターフェイスの表側の斜視図である。

【図14】同制御基板ボックスのXIV-XIV線矢視断面図である。

【図15】変形例にかかる起動処理のフローチャートである。

【図16】変形例にかかる制御基板ボックスの部分斜視図である。

【図17】同変形例にかかる制御基板ボックスの部分断面図である。

【図18】他の変形例にかかる制御基板ボックスの部分斜視図である。

【図19】同変形例にかかる制御基板ボックスの断面図である。

【図20】同変形例に対応した外部光通信インターフェイスの斜視図である。

【符号の説明】

10…制御基板ボックス

11…金属製ケース

12…樹脂板

13…キースイッチ

20…基板

21…CPU

22…ROM

31a, 31b…樹脂性支持部材

32…LED

33…フォトトランジスタ

34…インターフェイス回路

40…外部光通信インターフェイス

42a…入力部

42b…出力部

111…金属製ケース

111a1…スリット

132…LED

133…フォトトランジスタ

140…外部光通信インターフェイス

142a…入力部

142b…出力部

212…樹脂板

212a…凹部

214…マイクロスイッチ

221…CPU

232…LED

233…フォトトランジスタ

243…凸部

244…本体

312…透明の樹脂板

312a…筒部

320…プリント基板

321, 321…端子部

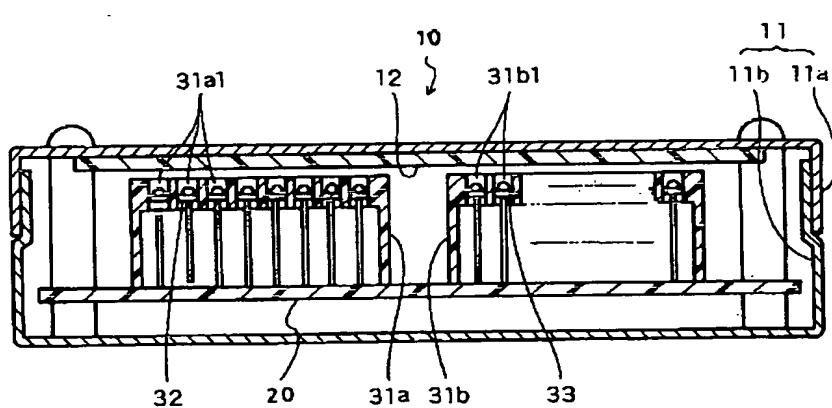
336…LED

340…外部光通信インターフェイス

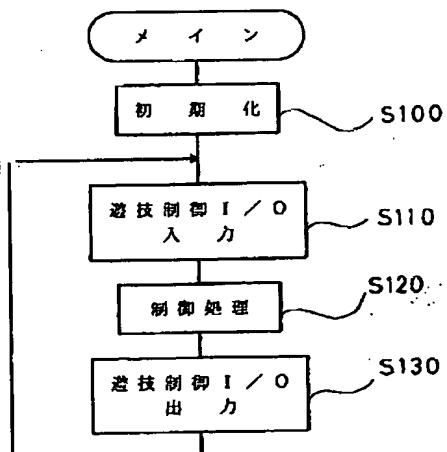
341…フォトトランジスタ

342…金属リング

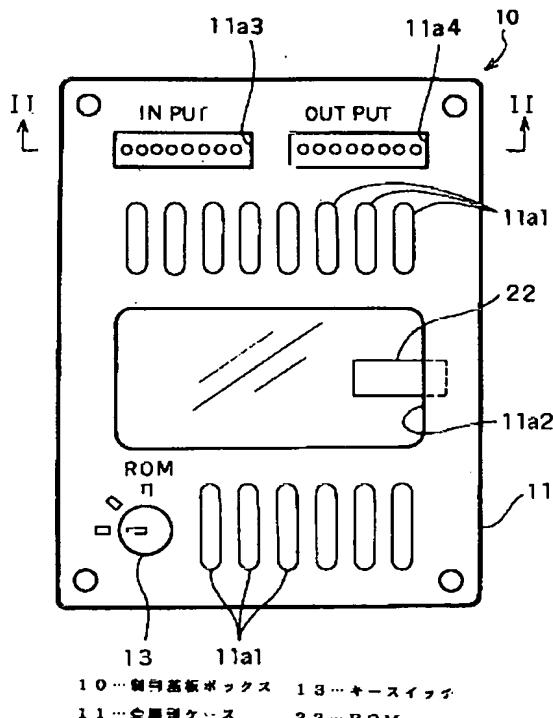
【図2】



【図4】

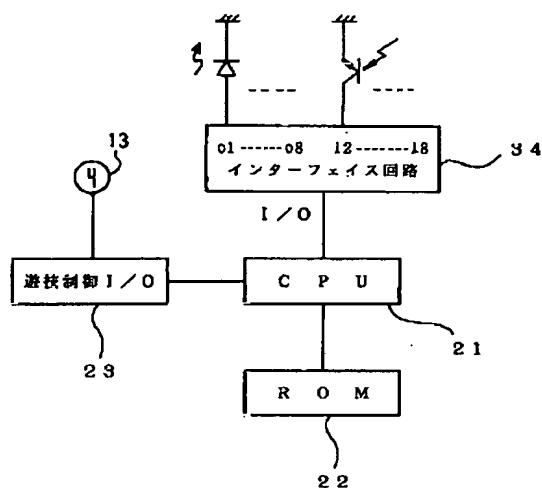


【図1】

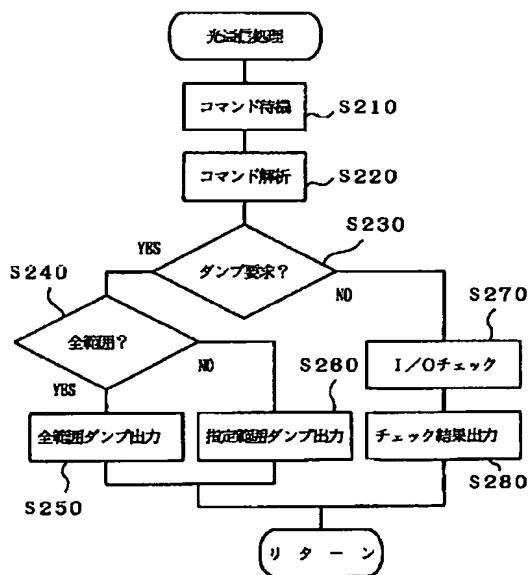


10…側面基板ボックス
11…全表面ケース
13…ケースイッパー¹³
22…ROM

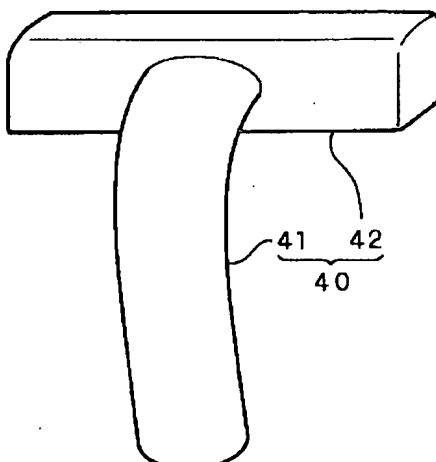
【図3】



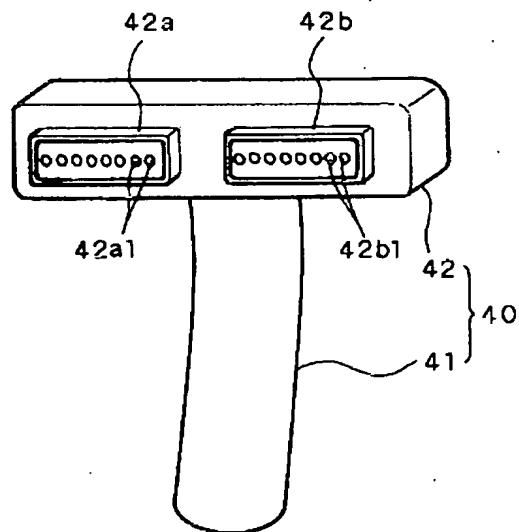
【図5】



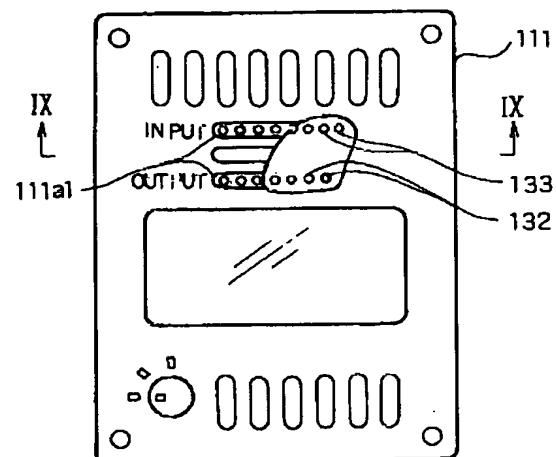
【図6】



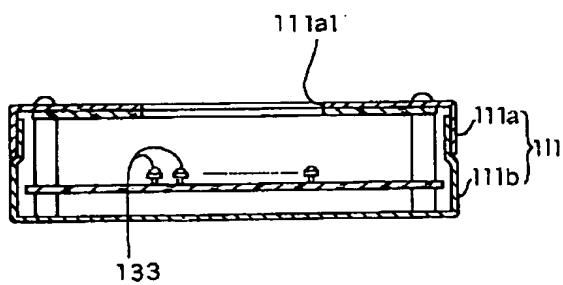
【図7】



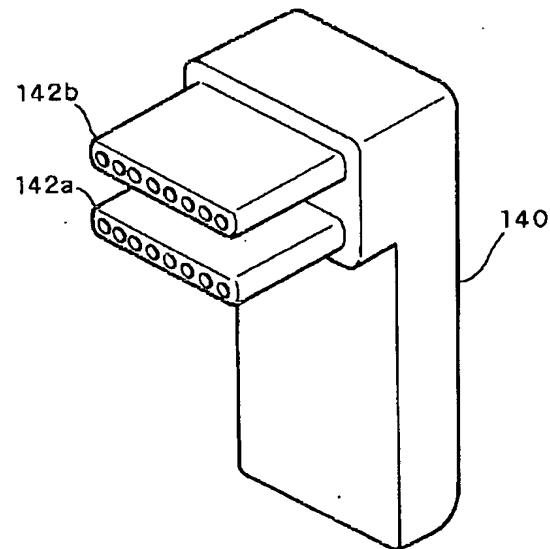
【図8】



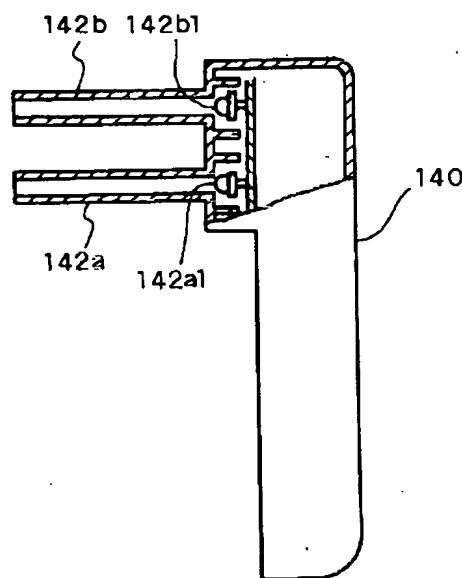
【図9】



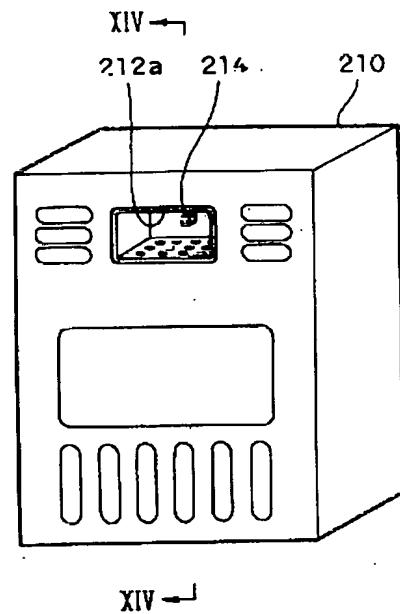
【図10】



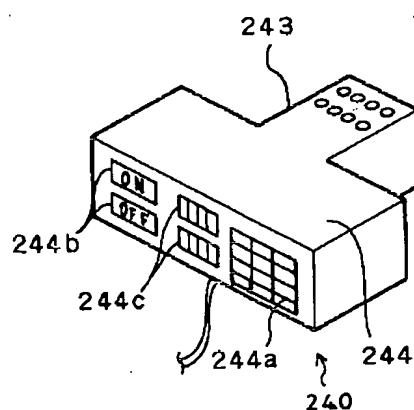
【図11】



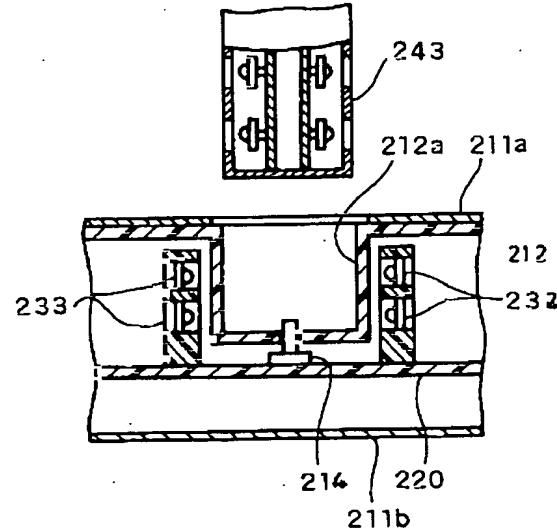
【図12】



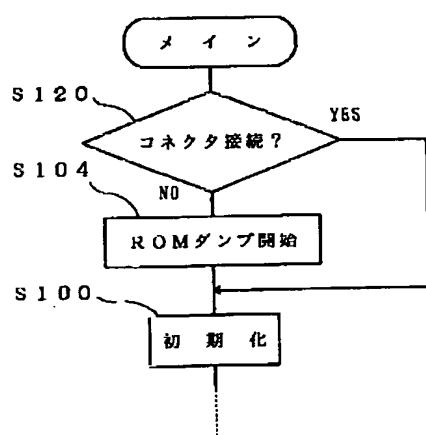
【図13】



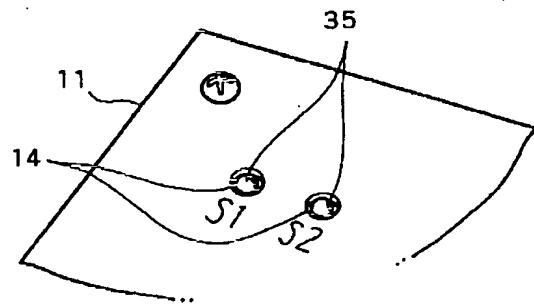
【図14】



【図15】

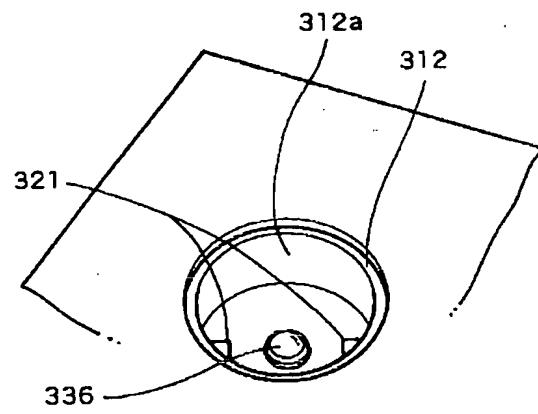
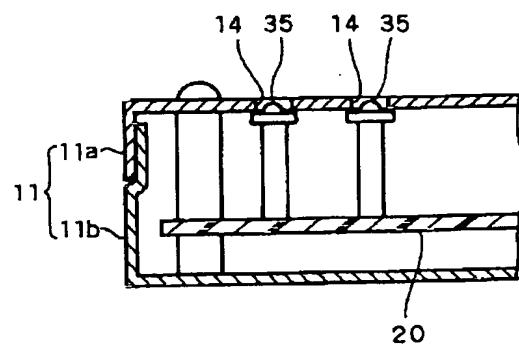


【図16】

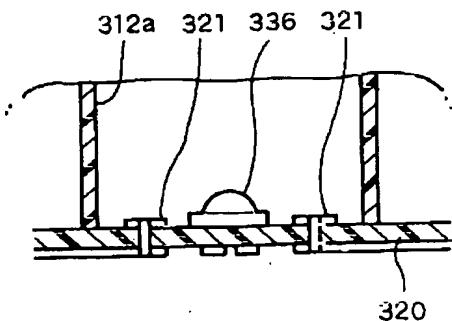


【図18】

【図17】



【図19】



【図20】

